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THE BRYOLOGIST

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THE GENUS PARMELIOPSIS OF NYLANDER[1]

LINCOLN W. RIDDLE

(With Plate XX)

The writer's interest in the group of lichens to be discussed in this paper was first aroused by collecting from an old fence in Needham, Massachusetts, a small, gray, foliose lichen, densely covered with isidia, and suggesting *Parmelia rudecta* Ach., but lacking the white punctations of that species. In subsequent collecting the lichen was found to grow also on the bark of pines, and proved to be common in Massachusetts, although apparently not much collected. A comparison with material in the Tuckerman Herbarium showed that the plant was what he had called *Cetraria aleurites* (Ach.) Th. Fr. But when the European authorities were consulted, it was found that there was much confusion in their interpretation of the *Lichen aleurites* of Acharius. Visits to the leading European herbaria in 1912–1913, including the original herbarium of Acharius now in the Botanical Museum at Helsingfors, gave an opportunity to study first hand the problem of *Lichen aleurites* and its allies.

These lichens have been known by American students under the names used in Tuckerman's "Synopsis of North American Lichens": *Cetraria aleurites*, *Cetraria aleurites* var. *placorodia*, *Parmelia ambigua*, and *Parmelia ambigua* var. *albescens*. Tuckerman thus considered two of these to be varieties of the other two, but most authors hold the view that there are four distinct species, and as will be shown later there are actually five recognizable forms. A glance at the synonymy cited below under the species *aleurites* will show how various have been the ideas in regard to the affinites of this plant. Furthermore, although Tuckerman and others have distributed these lichens between two genera, they are closely related, this close relationship leading to the confusion which has existed in regard to the names.

For this group of species, Nylander in 1861 (Lichenographia Scandinaviae, p. 105) proposed the name Parmeliopsis as a section of the genus Parmelia. Five years later (Lichenes Lapponiae Orientalis in Not. Sällsk. pro F. et Fl. Fenn. Forh. n. s. 5: 121) he established Parmeliopsis as a genus with *Lichen ambiguus* Wulfen as the type-species; and he continued this treatment of the group in the part of the second volume of his Synopsis Lichenum (page 53) published in 1888.[2]

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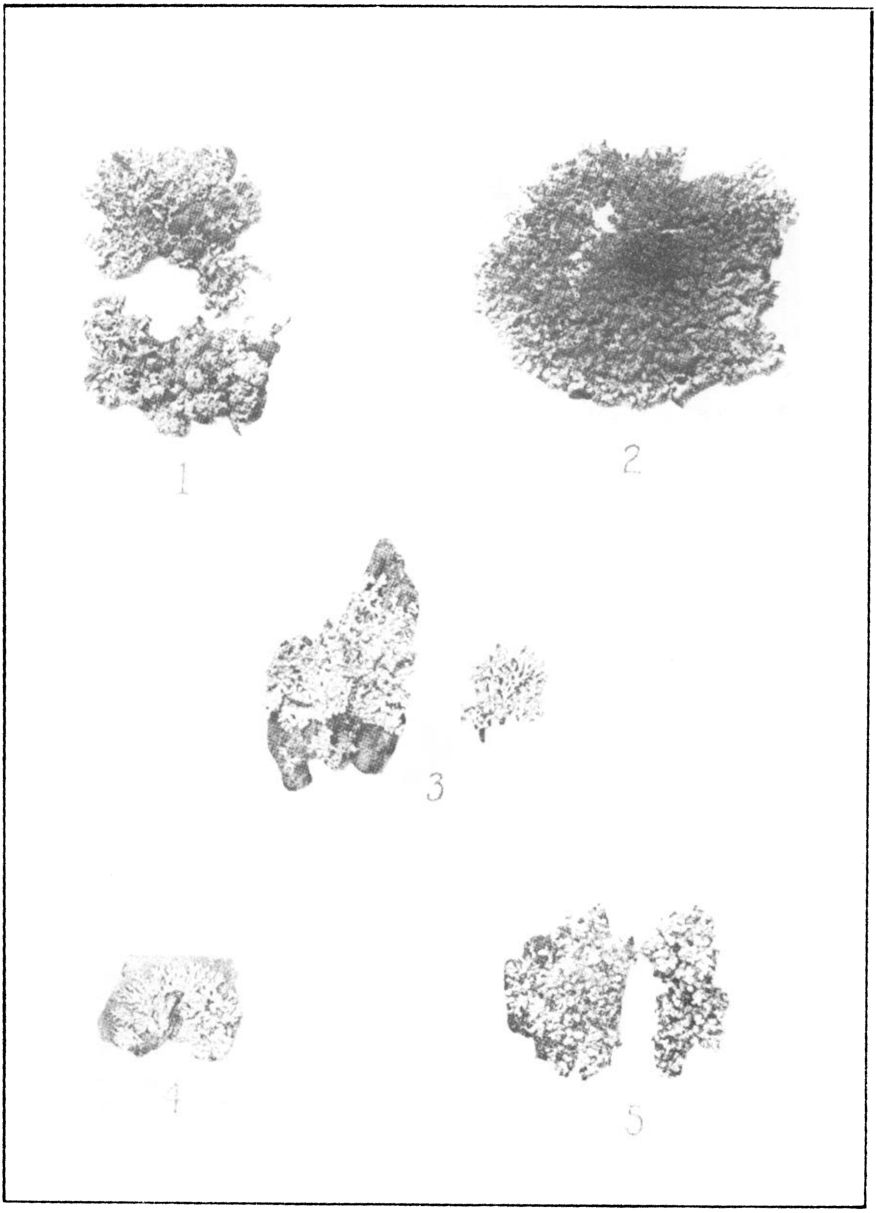
[1] Read at the December, 1916, meeting of the Sullivant Moss Society, New York City.

[2] This part of the Synopsis Lichenum bore no date. The date of publication as given by various authors varies considerably. I am adopting the date given by the Abbé Hue, who should certainly have been in a position to know.

The July number of the BRYOLOGIST was published August 15, 1917.

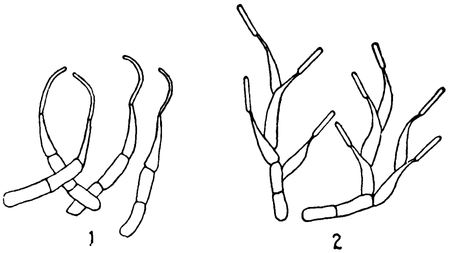


Explanation of Plate XX

(Photographed natural size from specimens in the writer's herbarium)

Fig. 1. *Parmeliopsis placorodia* (Ach.) Nyl.
Fig. 2. *Parmeliopsis aleurites* (Ach.) Nyl.
Fig. 3. *Parmeliopsis aleurites* var. *diffusa* (Ach.) Riddle.
Fig. 4. *Parmeliopsis ambigua* (Wulf.) Nyl.
Fig. 5. *Parmeliopsis diffusa* (Weber) Riddle.

The genus is distinguished from Parmelia by a purely technical character. In the spermagonia of Parmelia, the spermatia are borne laterally from joints of the sterigmata ("fulkren endobasidial" of Zahlbruckner, see text-figure 2) while in Parmeliopsis the spermatia are terminal only ("fulkren exobasidial," see text-figure 1). This distinction would be of doubtful generic value if it were not for the fact that these species obviously form a natural group, not conveniently classified with either Parmelia or Cetraria. It is an advantage, therefore, to have a name to designate the group, and Zahlbruckner (Engler and Prantl: Die Natürlichen Pflanzenfamilien, Teil I, Abteilung I,* p. 209, 1905) has accepted Nylander's name and conception of the group.



Sterigmata and spermatia of Parmeliopsis (fig. 1) and of Parmelia (fig. 2). Semi-diagrammatic.

The generic name to be used is, however, of less importance than the question of the specific names. But before discussing the nomenclature it will be well to have in mind the distinctive characters of the plants that are to be considered. There are four species, all foliose, and more or less closely appressed to the fence-rails, or to the bark of conifers upon which they grow:

A. A lichen with gray upper side, whitish under side, radiating lobes, and entirely free from isidia or soredia (Plate XX, fig. 1).

B. A lichen with gray upper side, whitish under side, occurring in two forms: the typical form with radiate lobes and dense isidia (Plate XX, fig. 2), and a variety with irregular lobes and scattered isidia (Plate XX, fig. 3).

C. A lichen with gray, often dirty-looking, upper side, and dark (castaneous to black) under side, with radiate lobes and powdery white soredia (Plate XX, fig. 5).

D. A lichen with straw-colored or sulphury upper side, dark (castaneous to black) under side, more or less radiate lobes, and soredia which are sulphury to distinctly yellow (Plate XX, fig. 4).

To give some idea of the confusion that exists, it may be pointed out that the name *placorodia* has been applied to forms A and B, the name *aleurites* to forms B and C, the name *diffusa* to forms B, C, and D. The isidiose plant, B, has been called *placorodia*, *aleurites*, *diffusa*, and *obsessa!*

The writer has adopted the names used in this paper after a careful study of all the types in the herbarium of Acharius. After repeated attempts to obtain information in regard to Weber's type of *diffusa* from the curator of the herbarium at Goettingen, without receiving any reply, it has been necessary to depend upon Weber's original description. This is, however, a long and detailed description, and as will be shown can apply to one of these plants only.

Most of the perplexity in the nomenclature of the species of Parmeliopsis has arisen through the confusion of the isidiose plant "B," with the sorediate plant "C" and through the confusion of the names *aleurites* and *diffusa.* It will, therefore, be convenient to discuss the two together. In trying to clear up the confusion, it is necessary to keep in mind that species "B" is isidiose above and pale beneath, while species "C" is sorediate above and dark brown to black beneath. The confusion between the two seems to have originated with Acharius himself in the use of the word "farinosus" (mealy) in his original description of *Lichen aleurites* (Lichenographiae Prodromus, p. 117) and his subsequent use of the word "pulverulentus" (powdery) in the description of *Parmelia aleurites* in the Synopsis Lichenum (page 208), these terms evidently applying to plant "C." But in both descriptions the plant is said to be "subtus cinerascens" (ashy beneath), which could apply only to plant "B." Nothing is said in Acharius' descriptions about isidia, although he uses the term "coralloideus" in describing the comparable isidiose species, *Parmelia rudecta.* When we turn to the plates cited by Acharius, we find the same confusion existing. The figures in Hoffmann's Enumeratio Lichenum (*Pl. 10, fig. 2.* 1784.) and in Dickson's Fasciculus Plantarum Cryptogamicarum Brittaniae (*Fasc. 3, t. 9, fig. 6.* 1793.) are too poor to show which plant is intended. In Hoffmann's Plantae Lichenosae (*T. 65, fig. 2.* 1801.) the figure represents what is here referred to as plant "A," while the text describes our plant "C." In the English Botany (*T. 858.* 1801.) the figure represents clearly an isidiose plant, but the text describes a sorediate plant.

The question could be settled only by examining the Acharian types. This the writer has done. The type of *Lichen aleurites* consists of six specimens mounted together on one sheet. Five of the specimens (four from Sweden and one from Germany) are all alike and are the radiate, densely isidiose plant, "B"! The sixth specimen is the stramineous, sorediate plant "D," and as Acharius invariably refers to his species as cinereous, the presence of this plant on the sheet must have been a slip. There can be no doubt, then, that the name *aleurites* Ach. should be used for the isidiose plant, "B."

In the application of the name *diffusus* Weber, it would seem as if there could be little doubt, although the synonymy cited below would indicate that there has been plenty of confusion. Weber's original description (Spicil. Flor. Goett., p. 250. 1778.) is unusually full and states: "In centro pulverulentus est . . color superne ex glauco albescens, inferne *ater.*" This certainly can not apply to a plant that is isidiose above and whitish to ashy beneath. Neither can it be applied, as Theodore Fries has done (in Lichenes Arctoi, p. 60, and in Lichenographia Scandinavica, p. 131) to a plant that he describes as "totus ochroleucus." The name *diffusus* Web. must be used for the gray sorediate plant with dark under side that is here discussed as "C."

Nylander in addition to misapplying the name *aleurites* to the sorediate plant, has applied the name *placorodia* Ach. to the isidiose plant. Acharius' original description (Synopsis Lichenum, p. 196. 1814.) applies exactly to the species here called "A," and does not mention isidia or soredia. The type-specimen came from North America, being sent to Acharius by Muhlenburg. It is the plant distributed under the name *placorodia* by Tuckerman in his Lichenes Americae Septentrionalis Exsiccati No. 71. Nylander's use of the name for the isidiose plant is, therefore, incorrect and should not be continued.

With few exceptions authors have correctly applied the name *ambiguus* Wulfen. The original description (in Jacquin's Collectanea Botanica **4**: 239. 1790.) states that the plant is "flavo-virescens . . tuberculis concoloribus farinaceis" and the accompanying plate (*T. 4, fig. 2.*) shows the plant here referred to as "D."

There remain to be considered three other names that have been connected with the species under discussion. These are *aleurites* var. *diffusa*, *hyperopta*, and *obsessa*, all of Acharius (see synonymy given below for bibliographical references). The type of *Parmelia aleurites* var. *diffusa* Ach. is made up of three specimens, one from Sweden, one from Germany (collected by Schreber), and one from France (collected by Dufour), all essentially the same, and closely related to *aleurites* but smaller, with the lobes more irregular, and the isidia finer and more scattered. The writer has collected material of this variety in Sweden, not far from Stockholm and, therefore, in the region in which Acharius lived. It is not uncommon in New England, and appears to be a form due to less favorable conditions in the habitat. It is, however, clearly recognizable and should be retained as a valid variety. The type-specimen of *Parmelia hyperopta* Ach. from Switzerland is in poor condition but represents the species already named *Lichen diffusus* by Weber. *Parmelia obsessa* Ach. (not Montagne, which is a *Physcia*) is represented by a specimen collected by Muhlenburg in North America. It is closest to *aleurites*, being copiously isidiose, but the under side is dark. It may best be regarded as an aberrant form of *Parmeliopsis aleurites.*

It will be convenient to sum up this discussion by giving a key to the North American representatives of the genus Parmeliopsis, with the diagnoses and synonymy of the species.

- A. Thallus without isidia or soredia. 1. *placorodia*
- AA. Thallus with either isidia or soredia.
  - B. Thallus with isidia.
    - C. Lobes regularly radiate and isidia densely crowded. 2. *aleurites*
    - CC. Lobes more or less irregular and isidia fine and scattered. 2a. *aleurites* var. *diffusa*
  - BB. Thallus with soredia.
    - C. Thallus yellowish with sulphury soredia. 3. *ambigua*
    - CC. Thallus gray, with whitish soredia. 4. *diffusa*

Note that all the species have the same habitat, namely, old fence-rails, and the bark of conifers, especially of Pinus rigida.

1. PARMELIOPSIS PLACORODIA (Ach.) Nyl.

Parmelia Ach. Syn. Lich. 196. 1814.

Parmeliopsis Nyl. Flora **52**: 445. 1869. as to nomenclature but not as to characters or plant!

Cetraria aleurites var. *placorodia* Tuck. Syn. N. A. Lich. **1**: 32. 1882.

Thallus orbicular, 1.5–3 cm. in diameter, thicker, more ascendant, and less closely adherent than in the other species; whitish to cinereous above, smooth at the circumference, rugose toward the center; never isidiose or sorediate; beneath whitish, with a few pale rhizoids; lobes 1–2 mm. wide, more or less regularly radiate, the tips sinuate-pinnatifid. Upper cortex 15–25μ thick, loosely and irregularly pseudoparenchymatous with thick-walled cells, 10–12μ in outside diameter, the lumina 3–6μ in diameter; lower cortex 15–30μ thick, well-developed, compact, and chondroid, the divisions between the cell-walls not visible, the lumina 2–4μ or rarely up to 6μ in diameter. Apothecia usually numerous, elevated, 1–8 mm., mostly 3 mm., in diameter; disk fulvous to badious,[3] flat or concave; thalline margin crenate, thin, often involute. Spores broadly ellipsoid, 5–9×3.5μ. Spermagonia frequent, occurring in the form of conspicuous, shining black tubercles.

Specimens examined from: Massachusetts (8 towns), Rhode Island, New Jersey, Maryland, District of Columbia.

Exsiccati: Tuckerman's Lich. Amer. Sept. No. 71. Decades N. A. L. No. 280. Lich. Bor. Am. No. 210. Merrill's Lich. Exs. No. 144.

Parmeliopsis placorodia differs from the other species of the genus in the absence of isidia and soredia. From all species of Parmelia it can be distinguished by the whitish, sparingly fibrillose, under side; from Cetraria by the color combined with the relatively narrow, radiate lobes.

2. PARMELIOPSIS ALEURITES (Ach.) Nyl.

Lichen Ach. Lich. Prodr. 117. 1798.

Parmeliopsis Nyl. Not. Sällsk. pro F. et Fl. Fenn. Forh. n. s. **5**: 121. 1866. as to nomenclature but not as to characters or plant!

Cetraria aleurites Th. Fr. Lich. Scand. 109. 1871. Tuck. Syn. N. A. L. **1**: 32. 1882.

Parmeliopsis placorodia Nyl. according to specimens in the Mus. d'Hist. Nat. Paris!

Platysma diffusum Nyl. Flora **55**: 247. 1872. Crombie Brit. Lich. **1**: 222, 1894, according to specimens in the British Museum! Not *Lichen diffusus* Weber.

Parmelia obsessa Ach. Syn. Lich. 213. 1814. according to type-specimen in the Botanical Museum, Helsingfors. Not *Parmelia obsessa* Mont.

Thallus orbicular, mostly 2–4 cm. in diameter, closely adherent to the substratum, whitish to cinereous or even fuscescent above, smooth at the circumference, otherwise densely covered with closely packed isidia; in old specimens the center becoming cracked, rimose-areolate and subcrustose, the isidia sometimes appearing white from abrasion, but the plant never sorediate; beneath whitish and rugose, with a few pale rhizoids. Lobes and anatomical structure as in *P. placorodia.* Apothecia rare, when present sometimes reaching 6 mm. in diameter, but usually 2–3 mm.; disk badious, concave; thalline margin crenate, lobulate, or tuberculate. Spores as in *P. placorodia.* Spermagonia rare, when present similar to those of *P. placorodia.*

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[3] According to color-chart in Saccardo's Chromotaxia.

Specimens examined from: New Hampshire, Vermont, Massachusetts (8 towns), Connecticut, Pennsylvania.[4]

The strongly isidiose thallus, with radiate lobes, and pale under side, is the distinguishing character of this species. There is no species of Cetraria that could possibly be confused with it. The whitish under side should easily separate it from all species of Parmelia, with the possible exception of *Parmelia rudecta* Ach. from which it differs in the smaller thallus, the narrower lobes, and the absence of white punctations.

2a. **Parmeliopsis aleurites var. diffusa** (Ach.) Riddle **comb. nov.**

Parmelia Ach. Lich. Univ. 485. 1810. not *Lichen diffusus* Web.

Agreeing with the typical form of the species in color, but the lobing irregular, and partly imbricate, and the isidia finer, fewer, and more scattered. Habitat as in the species, but commoner on the bark of conifers.

Specimens examined from: New Brunswick, New Hampshire, Massachusetts (2 towns), New Jersey, Maryland, South Carolina, Georgia.

According to the Vienna Code of Botanical Nomenclature (Article 53), the names *aleurites* var. *diffusa* Ach. and *diffusa* Weber may both be retained in the genus Parmeliopsis since they designate groups of different rank. *P. aleurites* var. *diffusa* is always isidiose, never sorediate; while *P. diffusa* is never isidiose, always sorediate.

3. PARMELIOPSIS AMBIGUA (Wulf.) Nyl.

Lichen Wulfen in Jacquin Coll. Bot. **4:** 239, *t. 4, fig. 2.* 1790.

Parmeliopsis Nyl. Not. Sällsk. pro F. et Fl. Fenn. Forh. n. s. **5:** 121. 1866.

Squamaria Hoffm. Pl. Lich. *t. 40, figs. 3–4.* 1794. good figure!

Parmelia ambigua Ach. Meth. Lich. 207. 1803. Tuck, Syn. N. A. L. **1:** 66. 1882.

Parmelia diffusa Th. Fr. Lich. Arct. 60. 1860. Lich. Scand. 131. 1871. Not *Lichen diffusus* Weber.

Thallus orbicular, usually 1–2 cm. in diameter, occasionally up to 5 cm., closely adherent to the substratum, from ochroleucous to distinctly yellow above, smooth toward the circumference, becoming rimulose and broken at the center, more or less covered with an effused mass of sulphury or yellowish, powdery soredia, or, in other cases, the soredia occurring in scattered, subpedicellate soralia, never isidiose; beneath castaneous to black, with scattered black rhizoids; lobes 1–2 mm. wide, more or less regularly radiate, and more deeply cleft and more discrete than is usual in the two preceding species. Upper cortex as in *P. placorodia;* lower cortex compact and chondroid, well-developed but thin, 12–15μ in thickness, with minute lumina, about 2μ in diameter. Apothecia rare, 1–3 mm. in diameter; disk badious or darker, flat becoming convex; thalline margin subentire, or crenulate, becoming thin. Spores oblong, straight or curved, $10–12 \times 2–3\mu$. Spermagonia minute, immersed in the thallus, and indicated by a darkened spot on the surface.

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[4] It seems to the writer that this species must be more widely distributed than the stations cited would indicate. He would be glad to receive specimens of any species of Parmeliopsis from any localities not listed in this paper. Through the kindness of Prof. Bruce Fink, the writer has examined the specimens upon which was based the record of *Parmelia aleurites* in the Lichens of Minnesota (Contrib. U. S. Nat. Herb. **14:** 197. 1910). They prove to belong to *Parmelia aurulenta* Tuck., and are, therefore, not to be included in the present group.

Specimens examined from: Alaska, Northwest Territory, British Columbia, Alberta, Greenland, Newfoundland, Maine, New Hampshire, Vermont, Massachusetts, New Jersey, Virginia, South Carolina, Alabama, Michigan, Wyoming, Colorado.

Exsiccati: Decades N. A. Lich. no. 108. Macoun Canad. Lich. no. 239 in part.

The color will distinguish this from any other species of the present genus. Sorediate species of Cetraria with similar coloration have the soredia confined to the margins. The only species of Parmelia that has comparable characters grows on rocks.

4. **Parmeliopsis diffusa** (Weber) Riddle **comb. nov.**

Lichen Weber Spicil. Flor. Goett. 250. 1778.

Parmeliopsis aleurites Nyl. according to specimens in Mus. d'Hist. Nat. Paris! Not *Parmelia aleurites* Ach.

Parmelia hyperopta Ach. Syn. Lich. 208. 1814. Th. Fries Lich. Scand. 120, 1871, according to type-specimen!

Parmeliopsis hyperopta Arnold Flora **62:** 329. 1879. Wainio Medd. Soc. F. et Fl. Fenn. **6:** 127. 1883. Zahlbr. in Engler & Prantl: Natürliche Pflanzenfamilien, Teil I, Abteilung I,* p. 209. 1905.

Parmelia ambigua var. *albescens* (Wahl.) Schaer. Enum. Lich. Europ. 47. 1850. Tuck. Syn. N. A. L. **1:** 66. 1882.

Thallus suborbicular, 1.5–3 cm. in diameter, closely adherent to the substratum, whitish to cinereous or subfuscescent above, smooth and even nitid toward the circumference, rimulose and becoming broken at the center, with more or less elevated balls of soredia, which are typically white, sometimes dirty-cinereous, scattered or densely packed toward the center, rarely becoming an effused, powdery mass (this condition less common than in *P. ambigua*) never isidiose. Remaining characters as in *P. ambigua.*

Specimens examined from: Alberta, Ontario, Labrador, Maine, New Hampshire, Washington.

Exsiccati: Decades N. A. L. no. 109. Macoun Canad. Lich. no. 239 in part.

In spite of the undeniably close relationship of this species with the preceding, it would seem logical to consider it a valid species rather than a variety, since the difference between ochroleucous and cinereous coloration is recognized to be of constant specific value in both Cetraria and Parmelia. The whitish soredia will distinguish *Parmeliopsis diffusa* from any other species of the genus, and also from any American species of Cetraria. It is much smaller than most species of Parmelia. It might possibly be confused with depauperate and adherent specimens of *Parmelia physodes*, which grows on the same substrata and is often sorediate, but in that species the soredia are always confined to the tips of the lobes. From sterile specimens of such sorediate Physcias as *Ph. crispa* and *integrata* var. *sorediosa*, apart from the difference in distribution, the anatomy of the thallus and the darker coloration of the under side would serve as a distinction.

WELLESLEY COLLEGE,
WELLESLEY, MASSACHUSETTS

PRELIMINARY NOTES ON THE LICHENS OF WHATCOM COUNTY, WASHINGTON[1]

A. C. HERRE

Whatcom County occupies the northern one of the northwest corners of the United States, as the state of Washington has what one might well call two northwest corners. This is due to the folding of the international boundary which turns southward from the 49th parallel to the strait of Juan de Fuca and then westerly to the Pacific. The county, which has a length of about 90 miles with a north and south breadth of 25 miles, has an area of 2226 square miles.

Excluding Lummi Island which lies just off the southwest corner of the county and which attains a height of about 1800 feet, the county is all on the mainland. It divides naturally into two physiographic provinces; the western fourth is largely a forest covered plain, consisting of the valleys of the Nooksack and Sumas rivers and the rolling uplands between them and southward, much of it less than 100 feet above sea level. It is bounded on the west by the Gulf of Georgia and Puget Sound; the remaining portion of the county lying to the eastward of this region of little elevation is covered by the Cascades. The plain is crossed from east to west by the Nooksack river and its tributaries but in the main the original topography has been greatly altered by glacial action and deposits which destroyed the old drainage, leaving many gravelly eskers, kames, ponds, sphagnum swamps, cranberry marshes, and peat bogs. The western fourth of the county contains all the cleared land and practically all the population.

The eastern three-fourths is a wild and little visited region of exceedingly rugged mountains which form a maze of irregular ranges. The main divide of the Cascades here has an elevation of between 6000 and 7000 feet and is clad in perpetual snow. Several peaks range from 8000 to 9000 feet in altitude while the mountains culminate in Mt. Baker, a huge volcano 10,780 feet in height. Mt. Baker and Mt. Shuksan have many large glaciers on their flanks, while a few hundred feet below the dome-like summit of Mt. Baker, at the so-called crater, is a vent from which come sulfurous gases and vapor.

Excluding the arctic realm of the higher mountains, and the alpine meadows more or less common above 5000 feet, the entire region was originally covered by the typical dense coniferous forest of the Puget Sound Valley. The principal lumber trees were and still are *Pseudotsuga mucronata* and *Thuya plicata*, though the giant trees reaching a height of from 200 to 300 feet have practically

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[1] Presented at the December, 1916, meeting of the Sullivant Moss Society, New York City.